CHAPTER 7

SPECIAL OBSERVER MISSIONS

This chapter implements STANAG 2934, Chapter 5 and QSTAG 246.

7-1. AERIAL FIRE SUPPORT OBSERVER

Because of the helicopter's speed, range, and ability to bypass obstacles, the AFSO can observe for indirect fire out to a greater distance than an observer with a ground unit.

a. If possible, the AFSO and the pilot should be given a detailed preflight briefing by the battalion FSO and the supported unit S3 or S2. The preflight briefing should cover the following:

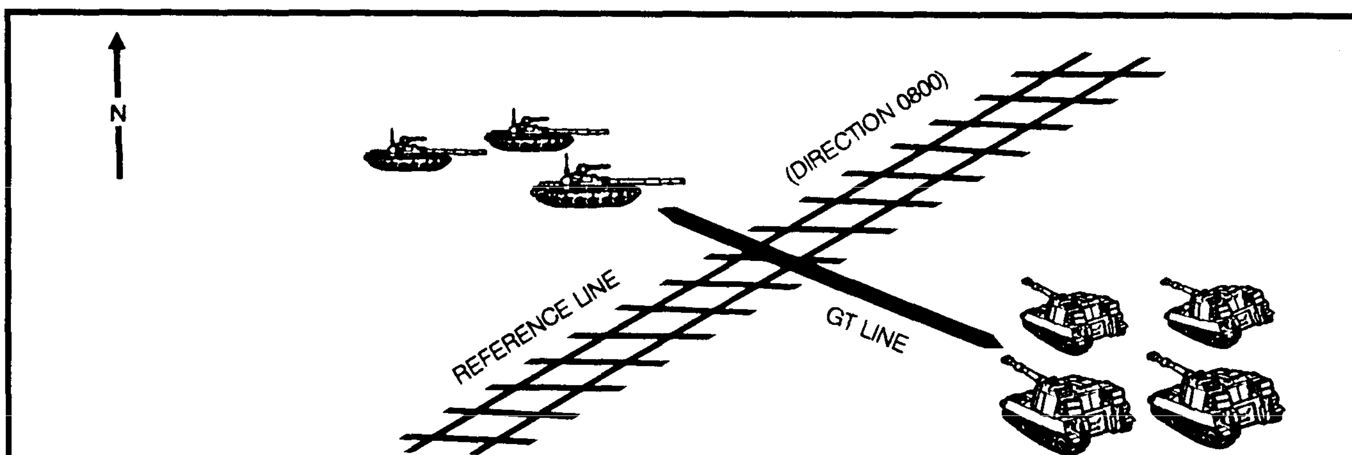
- The tactical situation to include enemy locations and antiaircraft weapons, friendly locations and capabilities, front lines, zones of action of support troops, and all coordinating measures. (Maps and overlay with this information should be available to the AFSO.)
- The location of all indirect fire units, known points, targets, mess to be searched, and ordnance available.
- Flight instructions, time on and off the mission, obstacles, checkpoints, and equipment needed.
- Communications details such as channels to use, call signs, check-in time(s), and prearranged signals.
- Any unit SOP items regarding calling for and executing registrations, immediate suppressions, special munitions, and suppression of enemy air defenses (SEAD).

b. The spotting line is the line along which the observer is going to adjust. The spotting line and its direction must be known by the FDC personnel. There are several possible spotting lines that the AFSO can use:

- Gun-target line.
- Observer-target line.
- Cardinal direction.
- Readily identifiable terrain feature.

(1) Gun-Target Line. Knowledge of the firing unit location allows the AFSO to determine the GT line (Figure 7-1) without requesting ranging rounds. The use of ranging rounds is undesirable, since they may help the enemy determine the firing battery position. The FDC assumes that the GT line is being used unless otherwise specified by the observer. If the observer does use the GT line, he should select a terrain feature (for example, a road, stream, or ridge line) that will help him remember the GT direction, Because of the low altitudes at which the observer is flying, using a spotting line other than the GT line often will be required. If the AFSO uses a spotting line other than the GT line, he must report it to the FDC.

Figure 7-1. REFERENCE LINE AND GT LINE



(2) Observer-Target Line. The aircraft heading indicator can be used to determine the OT direction. Since the aircraft is normally in a head-on posture when the observer is looking at the target, the heading indicator will provide an accurate direction in most cases. When this technique is used, direction should be sent to the nearest 10° (for example, **DIRECTION 70 DEGREES MAGNETIC** or **GRID).** If the OT direction changes more than 10° during a mission, the new direction should be sent to the FDC (assuming that the next corrections are sent in relation to the new OT line). This is the preferred method, as it minimizes observer reorientation and exposure time while maximizing aircraft maneuverability.

(3) Cardinal Direction. The observer may use cardinal direction (Figure 7-2) for sending his orientation. This is the least accurate method and therefore the least preferred.

(4) Readily Identifiable Terrain Feature. The observer may select a terrain feature which provides a reference line (for example; a railroad, a canal, or any series of objects). Before flight, if possible, the observer selects the line and sends the data to the FDC.

c. Obtaining accurate target location is difficult, since targets are normally acquired with the naked eye. Use of binoculars is limited because of distortion caused by the windscreen and vibration of the aircraft. Hand measurements or estimations should be used to measure angular deviation.

d. Target location is indicated by grid or by shift from a known point. The announced direction of the shift is with respect to the spotting line. If any spotting line other than the GT line is used, it must be identfied.

e. When adjusting fire, the AFSO will usually use either the stationary hover or the pop-up technique.

(1) In stationary hover, the pilot positions the aircraft behind trees or other terrain features that conceal the aircraft and still permit observation of the target.

(2) In pop-up, the pilot "unmasks" the aircraft 2 to 3 seconds before impact of the round. The AFSO observes the burst, and the pilot then returns the aircraft to the hide position or moves to another hide position. The observer sends his corrections as the pilot is "remasking" the aircraft. Time of flight is automatically sent to the AFSO. This allows the pilot to position the aircraft properly if "splash" time is not sufficient. Set patterns of movement must be avoided to enhance survivability.

f. Sample calls for fire are discussed below.

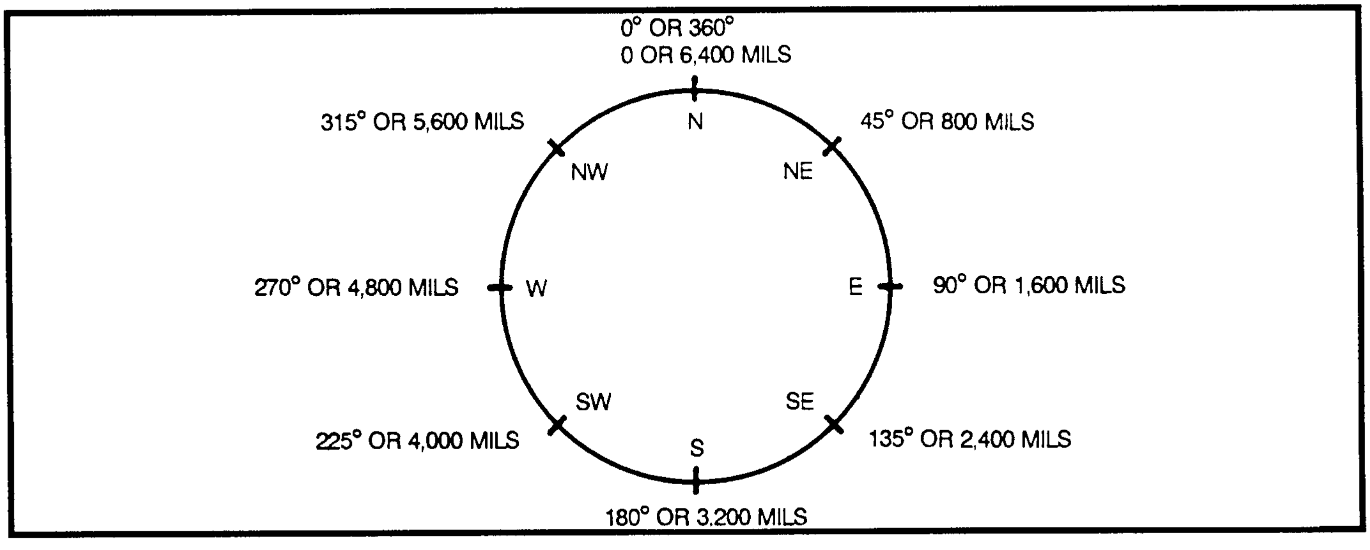
(1) An example of a call for fire in which the AFSO uses grid coordinates as the means of locating the target follows.

EXAMPLE

H18 THIS IS H90, ADJUST FIRE, OVER.
GRID NK421791, OVER.
INFANTRY PLATOON AND 10 TRUCKS IN THE OPEN, ICM IN EFFECT, OVER.

When adjusting rounds on a grid fire mission, the observer must identify the spotting line before making subsequent corrections, or the FDC will plot the corrections along the GT line.

Figure 7-2. **CARDINAL DIRECTIONS**



(2) An example of an AFSO's initial call for fire in which the target location is based on a shift from a known point and the GT line is used as the spotting line follows.

EXAMPLE
H18 THIS IS H90, ADJUST FIRE, SHIFT KNOWN POINT 1, OVER.
RIGHT 400, ADD 800, OVER.
INFANTRY PLATOON AND 10 TRUCKS IN THE OPEN, ICM IN EFFECT, OVER.

(3) An example of an AFSO's call for fire in which the target location is based on a shift from a known point and a line of known direction is used as the spotting line follows.

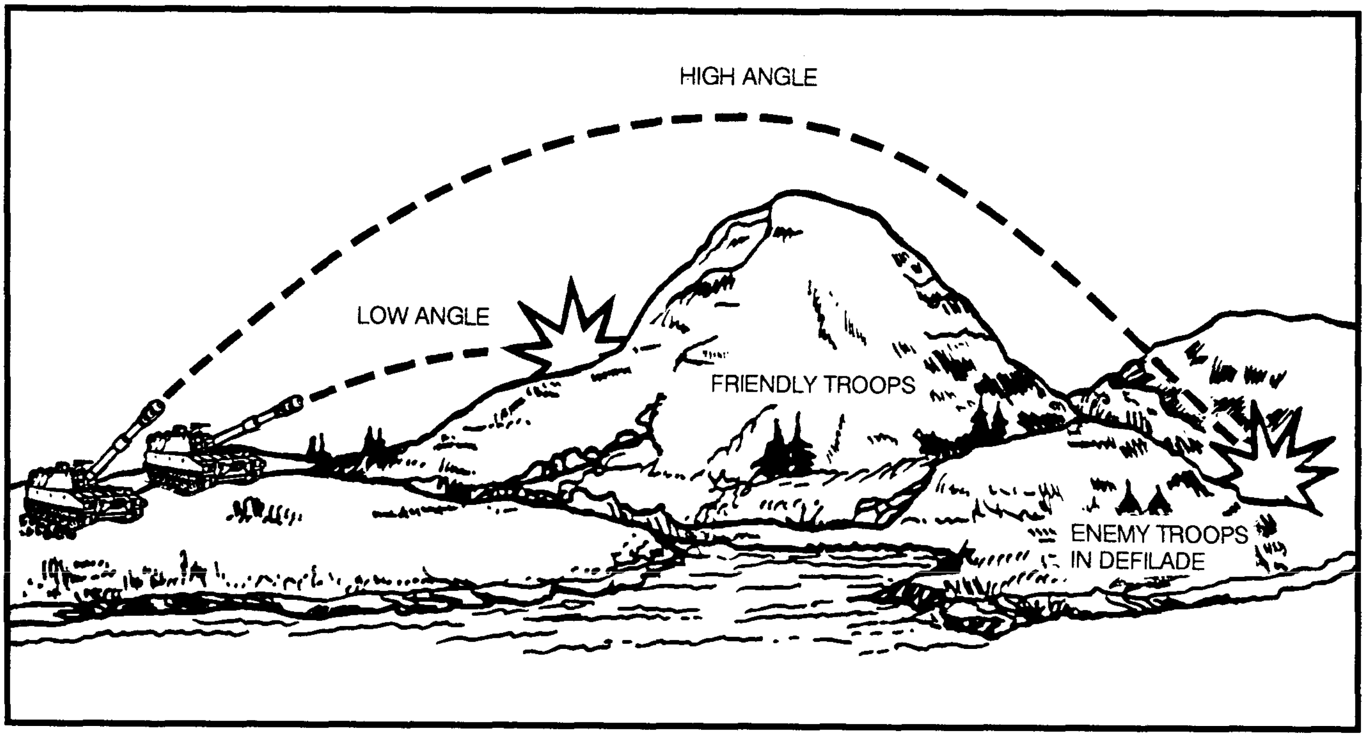
EXAMPLE
H18 THIS IS H90, ADJUST FIRE, SHIFT KNOWN POINT 3, OVER.
400 METERS NORTHEAST, OVER.
4 TRUCKS STALLED AT FORD, OVER.

7-2. HIGH-ANGLE FIRE

a. Fire delivered at quadrant elevations greater than the quadrant elevation for maximum range is called high-angle fire (Figure 7-3). High-angle fire is often required when the weapons fire out of deep defilade, from within built-up areas, or over high terrain features near friendly troops. High-angle fire may also be required when the target is located on a reverse slope, in jungles, or in deep gullies or ravines and cannot be reached by low-angle fire.

b. Generally, those weapons with a maximum elevation substantially in excess of 800 mils can fire high angle. All US field artillery weapons are capable of both low-angle and high-angle fire. Mortars are capable of only high-angle fire. Naval guns are not suitable for high-angle fire. Because of their high muzzle velocity, they are primarily used for low-angle fire. The observer procedure for the adjustment of high-angle fire is the same as that for the adjustment of low-angle fire. The observer must realize that small deviation corrections during adjustment may be unnecessary and time consuming because of the increased dispersion during high-angle fire. Since the time of flight is long in both adjustment and fire for effect, the FDC should announce **SHOT** and **SPLASH.** Fuze time is not used in high-angle fire. If an airburst is desired, fuze VT gives excellent results.

Figure 7-3. **HIGH-ANGLE FIRE**



7-3. FINAL PROTECTIVE FIRES

a. A final protective fire is an immediately available preplanned barrier of direct and indirect fire designed to provide close protection to friendly positions and installations by impeding enemy movement into defensive areas. Basically, it is an entire battery or mortar platoon firing so that the rounds are arranged on line. The size of the FPF depends on the number and type of weapon systems.

> **NOTE:** Though this is the planning formula, a maneuver commander may increase or decrease the length of an FPF to suit his needs. He must understand that an increase in the FPF length decreases the concentration of fires and therefore decreases its effectiveness. Naval gunfire ships are not normally assigned FPFs.

b. The location of the FPF is designated by the maneuver commander for whom it is being planned. The FPF is planned to support a defense and may be any distance from the friendly position. Normally, the FPF is within 200 to 400 meters (danger close) and is integrated into the final protective line of the maneuver unit. The importance of accurate defensive fires and the danger close situation require that each weapon firing the FPF be adjusted into place, if at all possible.

c. When an FPF with a manual FDC is established, the call for fire is similar to the normal call for fire in an adjust fire mission (with some exceptions).

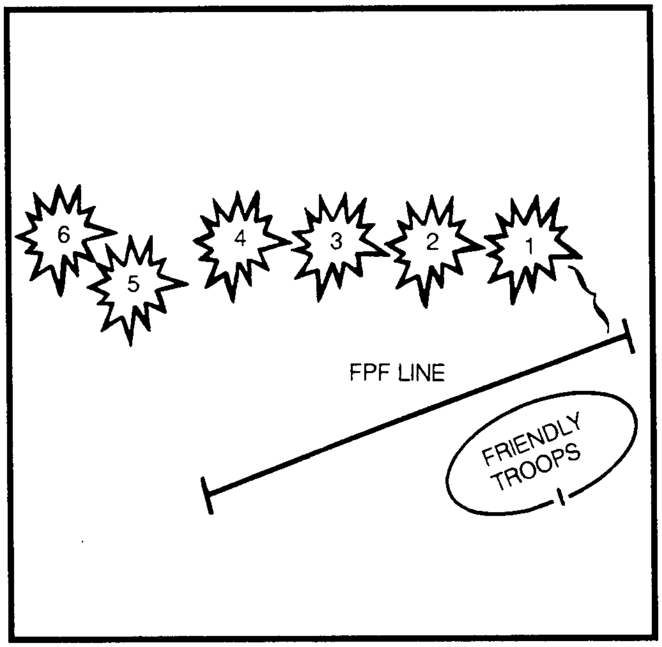
(1) If an adjustment is to be done, the target location first sent is not the location of the center of the FPF but is a grid a safe distance (400 to 600 meters) from friendly troops. Because this grid is part of a final defensive plan, it should be sent by secure means or encoded. The attitude of the FPF is also announced.

(2) Instead of a target description, **FINAL PROTECTIVE FIRES** is announced.

(3) **ATTITUDE AND DANGER CLOSE** (if applicable) are announced in the method of engagement.

d. The firing unit will fire a battery 1 volley centered on the initial grid sent by the observer. Assume that the rounds impact as shown in Figure 7-4. The observer begins his adjustment with the flank piece impacting closest to the FPF line (in this case, Number 1). (Creeping fire must be used in a danger close situation.) Corrections of 50 meters or less are not fired.

Figure 7-4. **ADJUSTMENT OF THE FPF BEGINS WITH ROUND NEAREST THE FPF LINE**

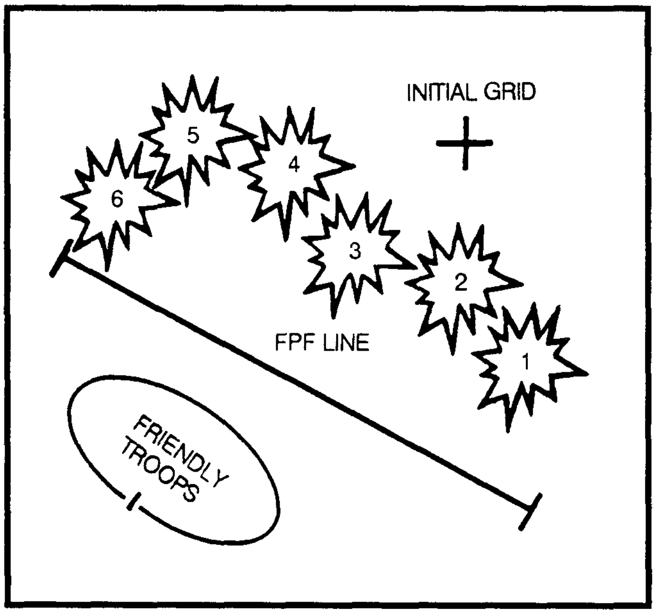


> **NOTE:** FDCs using muzzle velocity variations (MVVs) and special corrections adjust only the one piece.

e. Once the first gun is adjusted, the observer sends **NUMBER 2, REPEAT** and adjusts each weapon in succession.

> **EXAMPLE**
>
> The weapons firing are a 105-mm battery, The observer is shown the FPF line by the maneuver commander and sends the following call for fire:
>
> **H12 THIS IS H18, ADJUST FIRE, OVER.**
> **GRID NK123456, OVER.**
> **FINAL PROTECTIVE FIRE, ATTITUDE 1900, DANGER CLOSE, DELAY, OVER.**
>
> The unit fires a battery 1 round. The sheaf is shown in Figure 7-5. The observer notes that Number 6 is closest to the FPF line. He begins the adjustment with it:
>
> **DIRECTION 0810, NUMBER 6, LEFT 100, DROP 50, OVER.**
>
> The round is fired and the observer believes that the round is within 50 meters. He sends a correction (the round is not fired) and calls for Number 5 to fire:
>
> **NUMBER 6, DROP 50, NUMBER 6 IS ADJUSTED. NUMBER 5, REPEAT, OVER.**
>
> The other weapons are adjusted as discussed above.

Figure 7-5. ADJUSTMENT OF FPF BEGINS WITH NUMBER 6



f. If the FDC is using a computer (BCS or BUCS), MVVs, and special corrections, only the center weapon will be adjusted onto the center grid of the FPF and the adjustment will be ended.

g. Fuze delay should be used in adjustment to minimize the safety hazard to friendly units.

h. In some instances, there will not be time to "shoot in" the FPF. In this instance, the FPF will be called in. The grids of the two ends or the center grid and attitude will be given. If the FDC is using a BCS, then length, width, and attitude or a laser draw should be sent.

7-4. MULTIPLE MISSIONS

Contact with the enemy may be so intense that the forward observer must transmit two or more calls for fire and adjust all missions simultaneously. He should consult the maneuver unit commander, if possible, or use his own best judgment to determine which of several important targets should be engaged first. The experienced observer will have little trouble handling multiple missions if he tracks missions by target numbers. He may also record the corrections determined for each target to eliminate any confusion that may arise in the heat of battle. If other observers are using the same fire net, each observer should continue to use his call sign during the mission.

EXAMPLE

OBSERVER	FDC
H66 THIS IS H44, ADJUST FIRE, OVER.	
	H44 THIS IS H66, ADJUST FIRE, OUT.
GRID NK180513, OVER.	
	GRID NK180513, OUT.
INFANTRY PLATOON IN THE OPEN, ICM IN EFFECT, OVER.	
	INFANTRY PLATOON IN THE OPEN, ICM IN EFFECT, AUTHENTICATE PAPA BRAVO, OVER.
I AUTHENTICATE CHARLIE, OUT.	
	TIME, 2 ROUNDS, TARGET AA7731, OVER.
TIME, 2 ROUNDS, TARGET AA7731, OUT.	
DIRECTION 1830, LEFT 40, ADD 400, OVER.	
	DIRECTION 1830, LEFT 40, ADD 400, OUT.
H66 THIS IS H44, ADJUST FIRE, POLAR, OVER.	
	H44 THIS IS H66, ADJUST FIRE, POLAR, OUT.
DIRECTION 4600, DISTANCE 2100, OVER.	
	DIRECTION 4600, DISTANCE 2100, OUT.
RADAR IN OPEN, OVER.	
	RADAR IN OPEN, OUT.
	TIME, 1 ROUND, TARGET AA7732, OVER.
TIME, 1 ROUND, TARGET AA7732, OUT.	
AA7731 DROP 200, OVER.	
	AA7731 DROP 200, OUT.
AA7732 ADD 100, FIRE FOR EFFECT, OVER.	
	AA7732 ADD 100, FIRE FOR EFFECT, OUT.
AA7731 ADD 100, FIRE FOR EFFECT, OVER.	
	AA7731 ADD 100, FIRE FOR EFFECT, OUT.
AA7732 END OF MISSION, RADAR NEUTRALIZED, OVER.	
	AA7732 END OF MISSION, RADAR NEUTRALIZED, OUT.
AA7731 END OF MISSION, INFANTRY PLATOON NEUTRALIZED, ESTIMATE 10 CASUALTIES, OVER.	
	AA7731 END OF MISSION, INFANTRY PLATOON NEUTRALIZED, ESTIMATE 10 CASUALTIES, OUT.

7-5. OBSERVING HIGH-BURST OR MEAN-POINT-OF-IMPACT REGISTRATIONS

The opportunities for a precision registration are limited, since it requires visual observation on a clearly defined, accurately located registration point in the target area. At night, visual adjustment of fire on a registration point is impossible without some type of illumination or night observation device. In desert, jungle, or arctic operations, clearly defined registration points in the target area are not usually available. Special procedures, including observation techniques, have been developed to provide for registration under these conditions. One such procedure is the high-burst (HB) (Figure 7-6) or MPI registration. In an HB registration, two observers (referred to as O1 and O2) simultaneously observe time fire aimed at a point in the air above the target area. The FDC selects the point at which the fire is to be aimed. It does this by selecting a point on the ground in the area where the registration is desired and projecting this point into the air with a prescribed height of burst. The FDC controls the firing of the high-burst registration. A single weapon is used to fire the registration. All rounds are fired with the same data. Each observer, using an aiming circle, a G/VLLD, or a MULE, reports the direction from his position to the bursts. One observer reports the vertical angle after each round. An MPI registration is the same, except the rounds are fired with fuze quick.

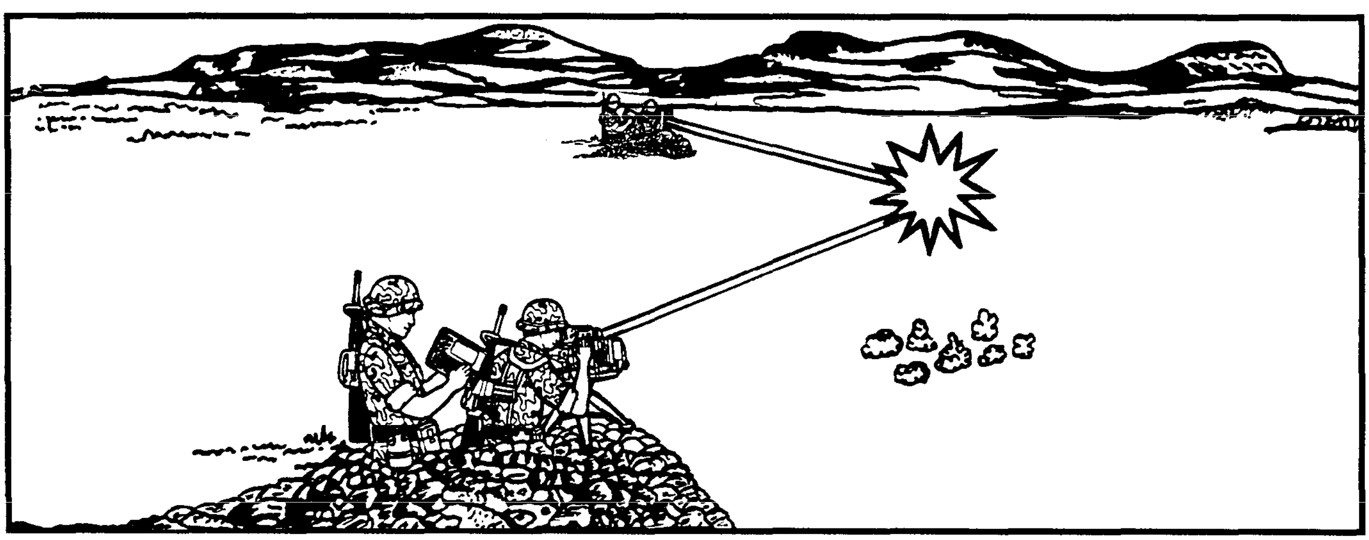
a. Location and Initial Orientation of the Observing Instruments. In an HB registration, the accurate location of each OP and the proper orientation of each observing instrument are very important. Each OP location is surveyed and a line of known direction is established on the ground so that the observer can orient his instrument for direction. If possible, the observer should establish his OP and orient his instrument for direction during daylight. However, the exact location of the instrument and the line of known direction should be marked so that they can be identified during darkness. These precautions allow the observer to position and orient his instrument during darkness if necessary. To establish the OP, the observer sets his instrument over the position marker, makes sure that the instrument is level, and then orients the instrument on the line of known direction. To orient the instrument on the line of known direction, the observer sets the azimuth of the line of known direction on the azimuth scales of the instrument by using the upper recording motion. Then, using the lower motion, he aligns the vertical crossline in the reticle on the marker or the point that identifies the known direction. The instrument is then properly oriented for direction. If using a laser, the observer places the vertical crossline on the known direction marker and uses the azimuth zero knob to put the known direction on the display, Once this is done, the instrument is oriented for direction.

b. Orientation of the Observing Instruments on the Orienting Point. The FDC tells each observer the direction and vertical angle from his position to the orienting point. The example below is a typical message from the FDC to the observers.

EXAMPLE

OBSERVE HIGH-BURST REGISTRATION, O1 DIRECTION 1164, VERTICAL ANGLE PLUS 12, MEASURE THE VERTICAL ANGLE. O2 DIRECTION 0718, VERTICAL ANGLE MINUS 3. REPORT WHEN READY TO OBSERVE.

Figure 7-6. **HIGH-BURST REGISTRATION**



(1) Each observer, using the upper motion, sets the direction given him on the azimuth scales of his instrument. The horizontal line of sight of the instrument now coincides with the horizontal line of sight from the observer's position to the orienting point. Each observer also sets the vertical angle given him on the elevation scales of his instrument to orient the instrument for height of burst. The manner in which the observer sets the vertical angle on the scales of his instrument depends on the type of observing instrument he is using.

(2) The elevation scales on the M2 aiming circle are graduated so that a 0 reading on the scales corresponds to a vertical angle of 0. The scales are graduated and numbered in each direction from 0. The graduations and numbers in one direction from 0 are printed in black; those in the other direction are printed in red. Positive (plus) vertical angles are indicated by the black numbers, and negative (minus) vertical angles are indicated by the red numbers. The elevation scales on the aiming circle are operated with the elevation micrometer knob. If the vertical angle given the observer is a positive (plus) angle, he sets its value on the elevation scales in the direction represented by the black numbers. If the vertical angle given the observer is a negative (minus) angle, he sets its value on the elevation scales in the direction represented by the red numbers, This action places the center of the crosslines in the reticle of the instrument in line with the point in the air selected as the orienting point.

c. Measuring and Reporting the First Round. When the observers report **READY TO OBSERVE,** the FDC directs the firing of the rounds one at a time. The FDC reports **SHOT** and **SPLASH** after each round is fired. When the burst of the first round appears, each observer determines the direction to the round. He does this by spotting the horizontal deviation from the vertical crossline in the reticle of the instrument and then combining this value with the reading on the azimuth scales. If the deviation is to the left of the vertical crossline, he subtracts the value from the reading on the azimuth scales. If it is to the right of the vertical crossline, he adds the value to the reading on the instrument.

EXAMPLE

A round bursts 20 mils right of the vertical crossline and the reading on the azimuth scales is 0480. The azimuth to the burst is 0500 (0480 + 20 = 0500).

The vertical angle to the burst is determined as discussed below.

(1) If the observer directed to measure the vertical angle is using an aiming circle, he spots the number of mils the burst appears above or below the horizontal crossline in the reticle of the instrument and combines this reading with the reading on the elevation scales.

EXAMPLE

The burst appears 10 mils above the horizontal crossline, and the reading on the elevation scales is +20. The vertical angle to the burst is +30 (20 + 10 = 30).

(2) The observers report in turn.

EXAMPLE

O1 DIRECTION 0500, VERTICAL ANGLE +30, OVER
O2 DIRECTION 0167, OVER.

(3) If the observer does not observe the initial round within the field of view of his instrument, he should report this and the approximate direction and vertical angle to where the round burst to the FDC.

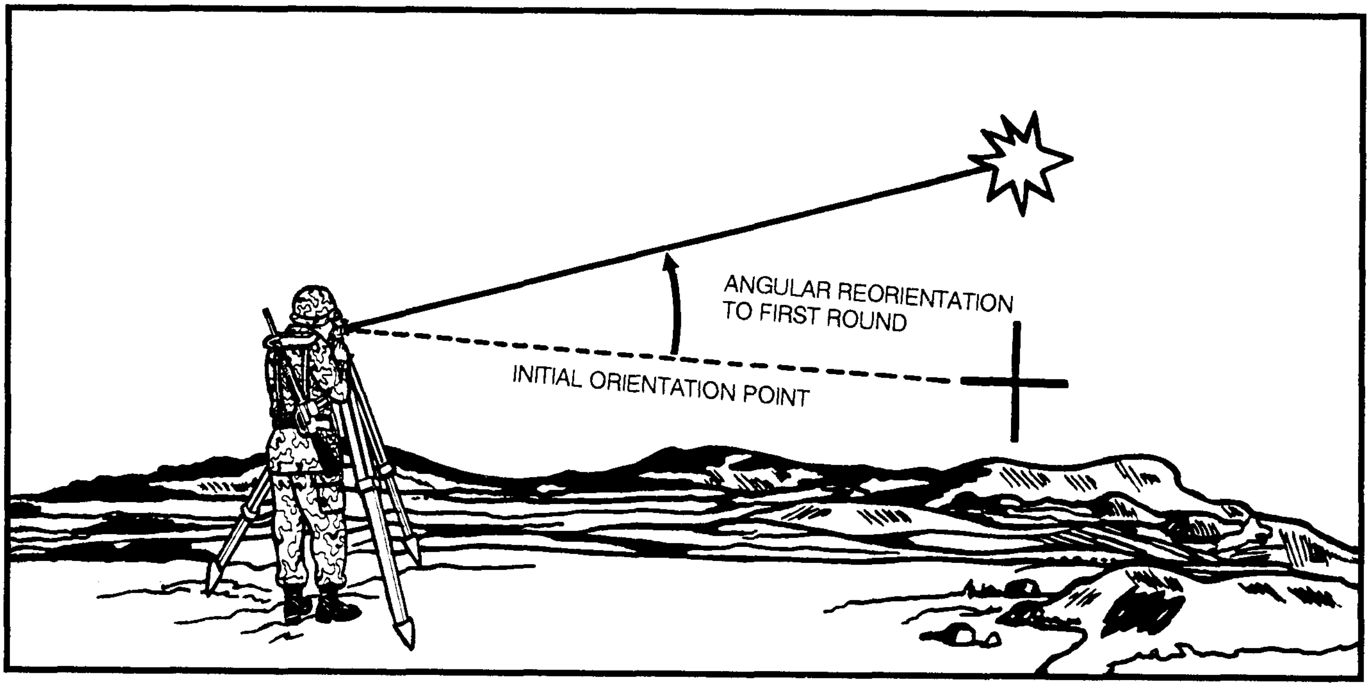
EXAMPLE

O2 ROUND UNOBSERVED TOO FAR LEFT, DIRECTION 0300, VERTICAL ANGLE +25, OVER.

d. Reorienting on the First Round. Once the observer reports his direction (and vertical angle, if applicable) to the first round, he reorients his instrument (Figure 7-7) on the direction and vertical angle to where that initial round burst. This allows for smaller deviation measurements for subsequent rounds.

e. Measuring and Reporting Subsequent Rounds. The procedures for measuring and reporting direction and vertical angle for subsequent rounds are the same as those for the first round. However, the observer does **not** reorient his instrument after subsequent rounds.

Figure 7-7. REORIENTATION AFTER THE FIRST ROUND



f. Observer Procedures in a High-Burst Registration. The following example illustrates the observer procedures in the conduct of a high-burst registration. Only observer O1 is discussed.

EXAMPLE

Observer O1 arrives at his position and locates the survey stake that marks the exact location of his instrument. The tag on the survey stake indicates that the azimuth of the known direction is 1,860 mils and that the direction is identified on the ground as the left edge of a red building approximately 1,500 meters to the right flank. Observer O1 places his aiming circle over the marking stake. With the upper recording motion, he sets off an azimuth of 1,860 mils on the azimuth scales. Using the lower motion, he aligns the crosslines in the reticle of the instrument on the left edge of the red building. He reports to the FDC that he is in position. Observer O1 receives the following message from the FDC: **OBSERVE HIGH-BURST REGISTRATION, O1 DIRECTION 0430, VERTICAL ANGLE PLUS 15, MEASURE THE VERTICAL ANGLE.**

With the upper motion, O1 turns the azimuth scales to 0430 and sets off +15 on the elevation scales. O1 reports the following to the FDC: **O1 READY TO OBSERVE.**

The FDC sends commands to the weapon to fire the first round. When the round is fired, the FDC reports to O1: **SHOT, OVER. SPLASH, OVER.**

When the first round bursts, O1 observes the burst 40 mils left of the vertical crossline and 5 mils below the horizontal crossline. Since the deviation is to the left of the vertical crossline, O1 subtracts 40 from the setting on the azimuth scales (0430) and obtains a direction of 0390. The burst appeared 5 mils below the horizontal crossline. Therefore, O1 subtracts 5 from the setting on the elevation scales (+15) and obtains a vertical angle of +10. O1 reports the instrument readings for the first round as follows: **O1 DIRECTION 0390, VERTICAL ANGLE PLUS 10, OVER.**

O1 reorients his aiming circle on a direction of 0390 and a vertical angle of +10. He then prepares to measure the deviation of subsequent rounds.

The FDC directs the weapon to fire. When the second round is fired, the FDC reports to O1: **SHOT, OVER. SPLASH, OVER.**

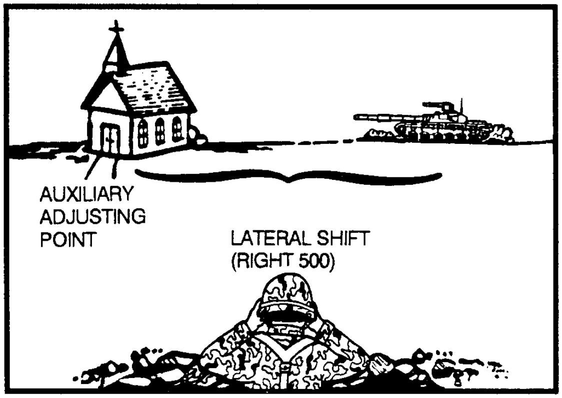
The procedures for measuring and reporting subsequent rounds are the same as those for the first round, except that measurement is read from the reoriented direction and vertical angle. When the FDC has enough instrument readings to compute the registration data, it terminates the registration by telling O1 **END OF MISSION.**

g. Mean-Point-of-Impact Registration. In an MPI registration, the FDC selects a ground location as the orienting point and uses impact fuzes in the registration. The establishment of the OPs and the procedures followed by the observers are the same as those in a high-burst registration. Vertical angle is still measured and reported, as this determines a more accurate altitude than is available from just a map spot.

7-6. AUXILIARY ADJUSTING POINT

To achieve surprise, the observer may decide not to adjust directly on the target but to adjust on a nearby point. This nearby point, the auxiliary adjusting point (Figure 7-8), must be far enough from the target (500 meters) that the real purpose of the adjustment is obscured. At the same time, the auxiliary adjusting point must be selected so that an accurate (preferably lateral) shift to the target can be determined. When the adjustment on the auxiliary adjusting point is complete, the shift to the target is made.

Figure 7-8. AUXILIARY ADJUSTING POINT



7-7. OBSERVER NOT ORIENTED

Poor visibility, unreliable maps, deceptive terrain, or rapid movement through unfamiliar terrain sometimes makes it difficult for the observer to orient himself. He may call for a marking round(s) to be fired on a known point, a previously fired target, or a prominent terrain feature (for example, **MARK KNOWN POINT 1** or **MARK HILL 37).** As a last resort, the observer may call for a round(s) to be fired into the center of the target area (for example, **MARK CENTER OF SECTOR).** The observer usually requests a type of projectile that is easily identifiable (such as white phosphorus) or a high airburst, or both. (The unit may have an SOP for shell-fuze combination.) The FDC prepares data that will place the round at the point requested by the observer. If the observer fails to see the round, the FDC prepares data that will move the next round to a different point of impact or that will raise the burst higher in the air. This procedure is continued until the observer positively identfies the round. He then orders a shift from the point of impact (burst) of the identified round to a target or an object that is permanent or semipermanent in nature, such as a road junction or the ruins of a building. Once this point has been located by adjustment of fire and has been plotted at the FDC, the observer may use it as a known point from which shifts can be made to subsequent targets.

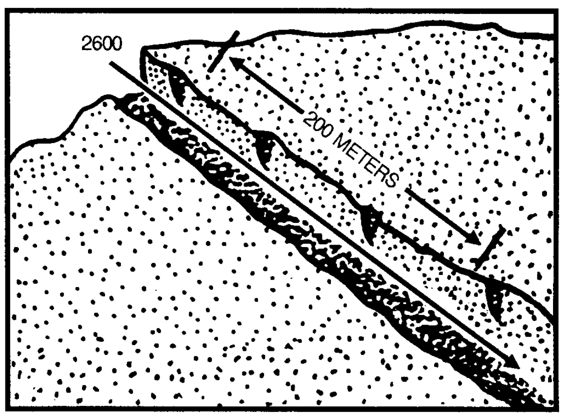
7-8. IRREGULARLY SHAPED TARGETS

When calling for fire on an irregularly shaped target, the observer must locate the target in sufficient detail to allow the FDO to decide the best method of attack.

a. The observer can send the grid, size, and attitude of the target. The grid he sends is the location of the center of the target. The target attitude is best described as a clockwise angle, in mils measured from grid north to a line passing through the long axis of the target (Figure 7-9). Attitude is sent to the nearest 100 mils and is always less than 3,200 mils.

EXAMPLE
E12 THIS IS E22, FIRE FOR EFFECT, OVER.
GRID NK847751, OVER.
INFANTRY PLATOON IN TRENCH LINE, 50 X 200, ATTITUDE 2600, VT, OVER.

Figure 7-9. TARGET ATTITUDE

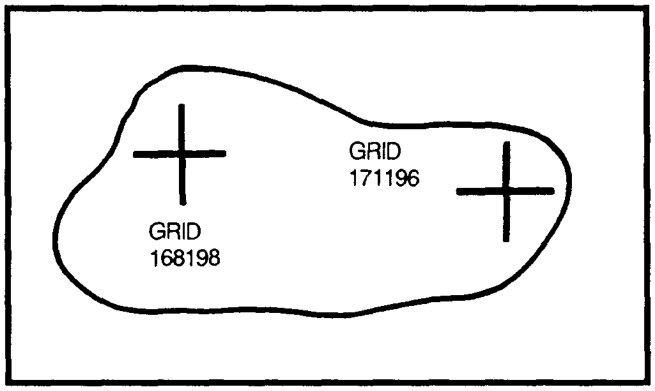


b. The observer can describe the target location by sending the two end grids (Figure 7-10).

EXAMPLE

E12 THIS IS E22 FIRE FOR EFFECT OVER
GRIDS NL168198 TO NL171196, OVER.
3 BTR-60s HALTED IN TREE LINE, DELAY, OVER.

Figure 7-10. **TARGET IDENTIFIED BY TWO END GRIDS**

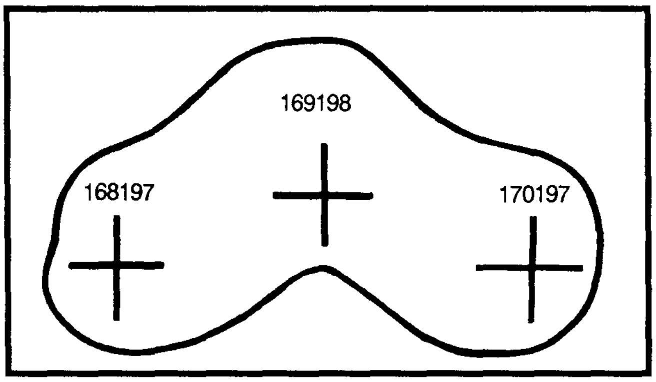


c. If the target cannot be described by a straight line between two grids, the observer can send three or more grids. For example, if the target is in a tree line that is V-shaped, the observer sends the grids of the two ends and the grid of the turning point (Figure 7-11).

EXAMPLE

E12 THIS IS E22, FIRE FOR EFFECT, OVER.
GRIDS NL168197 TO NL169198 TO NL170197, OVER.
INFANTRY COMPANY IN TREE LINE, OVER.

Figure 7-11. **TARGET IDENTIFIED BY THREE GRIDS**

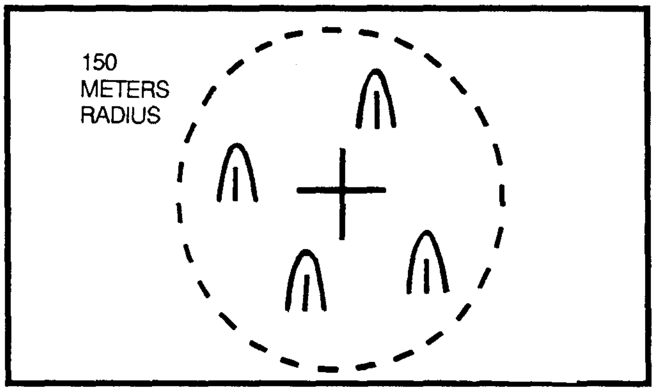


d. If a target might best be described as a circle, the observer would send the grid of the circle center and the radius of the circular target (Figure 7-12).

EXAMPLE

E12 THIS IS E22, FIRE FOR EFFECT, OVER.
GRID NK642377, OVER.
SAGGER MISSILE CLUSTER, RADIUS 150, ICM, OVER.

Figure 7-12. **CIRCULAR TARGET**



e. When BCS or BUCS is being used in the FDC, the observer cannot send multiple grid target locations. He may send the center location and length, width, and attitude. On an irregularly shaped target, he may send polar data to multiple points on the target and identify these points to the FDC as a laser draw.

7-9. ADJUSTMENT BY SOUND

a. If observer visibility is limited, fire may be adjusted by the use of sound. The target location may be reported to the observer by the supported unit, or it may be determined by the observer. If the observer can hear noises at the enemy position (weapons firing or vehicle or troop movement), he can estimate a direction and a distance from his position. The observer must alert the FDC when he is adjusting by sound.

b. Upon hearing the burst of the adjusting round, the observer estimates the direction to the burst and compares it with the direction to the target. He converts the deviation to a lateral shift, in meters (using estimated range to the target). Distance to the adjusting point is difficult to judge. Therefore, the observer may have to use a creeping technique to adjust onto the target. He can determine the distance by measuring the time it takes the sound of the burst to reach him and multiplying the time interval by the speed of sound (350 meters per second) (flash to bang). To help the observer determine distance accurately, the FDC must announce the precise moment of impact.

c. The observer must use caution in very broken terrain. In hills and mountains, the sound may travel around a hill mass before it arrives at the observer's position and may produce a false direction to the burst.

7-10. EMERGENCY OBSERVER PROCEDURES

a. In an emergency situation when an FDC is not available, the observer may determine and send fire commands directly to the battery. Initial data are determined by the steps discussed below.

(1) Estimate the range from the battery to the target.

(2) Determine the charge by using the following rules:

- 105-mm: Charge equals range in thousands plus 1 (for example, for range 4000, the charge is 5).
- 155-mm: Charge equals range in thousands (for example, for range 5000, the charge is 5).
- 203-mm: Charge equals range in thousands minus 1 (for example, for range 5000, the charge is 4).

(3) Determine the deflection from the battery to the target by converting the azimuth to the target into deflection. You must know the battery azimuth of lay. Azimuth of lay equals deflection 3200. Using the LARS (left, add; right, subtract) rule, determine the deflection to fire by adding or subtracting the difference between the azimuth of lay and the azimuth to the target to or from 3200.

(4) Fire quadrant 240 mils.

b. Subsequent corrections are made with respect to the GT line.

(1) Determine 100/R. 100/R equals 100 divided by the range in thousands to the nearest hundred; for example, range 4600, 100/R = 100/4.6 ≈ 22.

(2) Determine correction in deflection. Correction in deflection, in mils, equals the change in meters (divided by 100) times 100/R (left, add; right, subtract); for example, correction R120 = 120/100 = 1.2 x 22 (100/R) = 26.4 ≈ 26 mils.

(3) Determine the number of mils change to quadrant that will give a 100-meter range change (C-factor). Use Table 7-1. Change in quadrant is expressed in mils (range change in hundreds of meters times C-factor).

Table 7-1. **EMERGENCY OBSERVER PROCEDURES**

WEAPON	C-FACTOR
105-mm M101A1	13 minus charge
105-mm M102	12 minus charge
155-mm M114A1	12 minus charge
155-mm M109, M114A1, M109A1/A2/A3, and M198	11 minus charge
203-mm M110/M110A1	10 minus charge

(4) Determine the fuze setting by estimating time of flight.

(5) Adjust the height of burst by using a factor of 2 divided by the initial fuze setting for each 10-meter change to HOB (up, subtract; down, add).

c. This system is valid only for charges 3, 4, and 5 of all weapon systems.

EXAMPLE

GIVEN

Weapon: 155-mm M198 = C-factor 11 minus charge.
Range: 5000 = charge 5, quadrant 240.
Azimuth of lay: 3200.
GT direction: 0600.
Deflection: 2,600 meters.
First round is spotted as 600 meters short, 100 meters right.

SUBSEQUENT CORRECTION

100/R: For range 4400, 100/R = 103/4.4 ≈ 23.
Correction in deflection: Left 100 = 100/100 = 1.0 x 23 = 23 mils;deflection 2623.
Correction to quadrant: 11 - 5 = 6 x 6 = 36 = quadrant 240 + 36 = 276.